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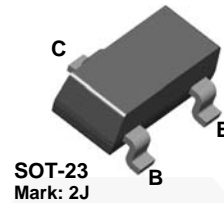


March 2014

MMBT3640 PNP Switching Amplifier

Description

This device is designed for very high-speed saturated switching at collector currents to 100 mA. Sourced from process 65.



Ordering Information

Part Number	Marking	Package	Packing Method
MMBT3640	2J	SOT-23 3L	Tape and Reel

Absolute Maximum Ratings^{(1),(2)}

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	-12	V
V_{CBO}	Collector-Base Voltage	-12	V
V_{EBO}	Emitter-Base Voltage	-4	V
I_C	Collector Current - Continuous	-200	mA
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Notes:

1. These ratings are based on a maximum junction temperature of 150°C .
2. These are steady-state limits. Fairchild Semiconductor should be consulted on applications involving pulsed or low-duty-cycle operations.

Thermal Characteristics⁽³⁾

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Max.	Unit
P_D	Total Device Dissipation	225	mW
	Derate Above $T_A = 25^\circ\text{C}$	1.8	mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	556	$^\circ\text{C}/\text{W}$

Note:

3. Device mounted on FR-4 PCB 1.6 inch X 1.6 inch X 0.06 inch.

Electrical Characteristics

Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit	
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage ⁽⁴⁾	$I_C = -10\text{ mA}, I_B = 0$	-12		V	
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$I_C = -100\ \mu\text{A}, V_{BE} = 0$	-12		V	
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -100\ \mu\text{A}, I_E = 0$	-12		V	
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = -100\ \mu\text{A}, I_C = 0$	-4.0		V	
I_{CES}	Collector Cut-Off Current	$V_{CE} = -6.0\text{ V}, V_{BE} = 0$		-0.01	μA	
		$V_{CE} = -6.0\text{ V}, V_{BE} = 0,$ $T_A = 65^\circ\text{C}$		-1.00		
I_B	Base Current	$V_{CE} = -6.0\text{ V}, V_{BE} = 0$		-10	nA	
h_{FE}	DC Current Gain ⁽⁴⁾	$I_C = -10\text{ mA}, V_{CE} = -0.3\text{ V}$	30	120		
		$I_C = -50\text{ mA}, V_{CE} = -1.0\text{ V}$	20			
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ⁽⁴⁾	$I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$		-0.30	V	
		$I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$		-0.20		
		$I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$		-0.60		
		$I_C = -10\text{ mA}, I_B = -1.0\text{ mA},$ $T_A = 65^\circ\text{C}$		-0.25		
$V_{BE(sat)}$	Base-Emitter Saturation Voltage ⁽⁴⁾	$I_C = -10\text{ mA}, I_B = -0.5\text{ mA}$	-0.75	-0.95	V	
		$I_C = -10\text{ mA}, I_B = -1.0\text{ mA}$	-0.80	-1.00		
		$I_C = -50\text{ mA}, I_B = -5.0\text{ mA}$		-1.50		
f_T	Current Gain - Bandwidth Product	$I_C = -10\text{ mA}, V_{CE} = -5.0\text{ V},$ $f = 100\text{ MHz}$	500		MHz	
C_{ob}	Output Capacitance	$V_{CB} = -5.0\text{ V}, I_E = 0,$ $f = 1.0\text{ MHz}$		3.5	pF	
C_{ib}	Input Capacitance	$V_{EB} = -0.5\text{ V}, I_C = 0,$ $f = 1.0\text{ MHz}$		3.5	pF	
t_d	Delay Time	$V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$		10	ns	
t_r	Rise Time			30	ns	
t_s	Storage Time		$V_{CC} = -6\text{ V}, I_C = -50\text{ mA},$ $I_{B1} = I_{B2} = -5.0\text{ mA}$		20	ns
t_f	Fall Time				12	ns
t_{on}	Turn-On Time	$V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$		25	ns	
		$V_{CC} = -1.5\text{ V}, I_C = -10\text{ mA},$ $I_{B1} = I_{B2} = -0.5\text{ mA}$		60		
t_{off}	Turn-Off Time	$V_{CC} = -6\text{ V}, V_{BE(off)} = -1.9\text{ V},$ $I_C = -50\text{ mA}, I_{B1} = -5.0\text{ mA}$		35	ns	
		$V_{CC} = -1.5\text{ V}, I_C = -10\text{ mA},$ $I_{B1} = I_{B2} = -0.5\text{ mA}$		75		

Note:

4. Pulse test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2.0\%$.



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